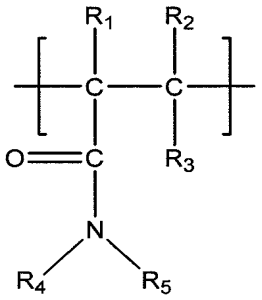
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A synthetic co-polymer comprising one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety, said synthetic co-polymer having a number average molecular mass between about 2,000 and about 1,000,000 Daltons, wherein said synthetic co-polymer is reactive with primary amines via the pendant cross-linkable moiety~~.~~ , wherein said acrylamide co-monomer and said hydrophilic co-monomer are different, and wherein said co-polymer is suitable for implantation in a patient.

2. (Currently Amended) The synthetic co-polymer according to claim 1, wherein:

(a) said N-alkyl or N,N-dialkyl substituted acrylamide co-monomer has a structure of Formula I:

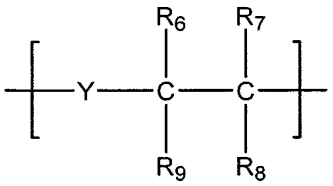


I

wherein:

R_1, R_2, R_3, R_4 and R_5 are independently selected from the group of: H and lower alkyl;

(b) said hydrophilic co-monomer has a structure of Formula II:



II

wherein:

Y ~~is O or~~ is absent;

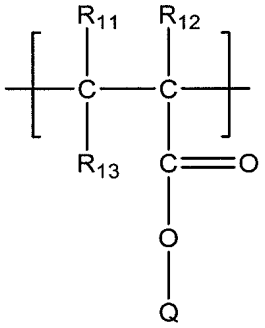
R_6, and R_7 are independently selected from the group of H and lower alkyl;

R_8 is H, lower alkyl or -OR', where R' is H or lower alkyl; and

R_9 is H, lower alkyl or $-C(O)R_{10}$, and

R_{10} is ~~$-NR_4R_5$ or~~ -OR", where R" is H or CH_2CH_2OH; and

(c) said acryl- or methacryl- carboxylic acid co-monomer has a structure of Formula III:



III

wherein:

R_{11}, R_{12} and R_{13} are independently selected from the group of: H and lower alkyl, and

Q is N-succinimido, 3-sulpho-succinimdo (sodium salt), N-benzotriazolyl, N-imidazolyl and p-nitrophenyl.

3-4. (Cancelled)

5. (Currently Amended) The synthetic co-polymer according to claim ~~1~~ 2, wherein said alkyl or lower alkyl is a straight or branched chain alkyl group having between one and eight carbon atoms.

6. (Original) The synthetic co-polymer according to claim 2, wherein the combined molar ratio of N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and hydrophilic co-monomer is between about 50% and about 99.5% and the molar ratio of derivatised acryl- or methacryl- carboxylic acid co-monomer is between about 0.5% and about 50%, wherein the sum of said molar ratios is 100%.

7. (Cancelled)

8. (Previously Presented) The synthetic co-polymer according to claim 1, wherein said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer is selected from the group of N-methylacrylamide, N-ethylacrylamide, N isopropylacrylamide (NiPAAm), N-octylacrylamide, N-cyclohexylacrylamide, N-methyl-N-ethylacrylamide, N-methylmethacrylamide, N-ethylmethacrylamide, N-isopropylmethacrylamide, N,N-dimethylacrylamide, N,N-diethylacrylamide, N,N-dimethylmethacrylamide, N,N-diethylmethacrylamide, N,N-dicyclohexylacrylamide, N-methyl-N-cyclohexylacrylamide, N-acryloylpyrrolidine, N-vinyl-2-pyrrollidinone, N-methacryloylpyrrolidine, and combinations thereof.

9. (Currently Amended) The synthetic co-polymer according to claim 1, wherein said one or more hydrophilic co-monomer is a selected from the group of: acrylic acid, methacrylic acid, 2-hydroxyethyl methacrylate (HEMA), ~~N,N-dimethylacrylamide, N,N-diethylacrylamide, 2-[N,N-dimethylamino]ethylacrylamide, 2-[N,N-diethylamino]ethylacrylamide, N,N-diethylmethacrylamide, 2-[N,N-dimethylamino] ethylmethacrylamide, 2-[N,N-diethylamino]ethylmethacrylamide,~~ 2-vinyl-N-pyrrollidone, 2-[N,N-diethylamino] ethylacrylate, 2-[N,N-dimethylamino]ethylacrylate, 2-[N,N-diethylamino]ethylmethacrylate, 2-[N,N-dimethylamino]ethylmethacrylate, and combinations thereof.

10. (Previously Presented) The synthetic co-polymer according to claim 1, wherein said one or more acryl- or methacryl-carboxylic acid co-monomer is selected from the group of acrylic acid, methacrylic acid, and substituted versions thereof, and said cross-linkable moiety is a succinimidyl group, an imidazole, a benzotriazole, ap-nitrophenol or 2-(N-morpholino)ethanesulphonic acid.

11. (Original) The synthetic co-polymer according to claim 2 that comprises N,N-dimethylacrylamide and N-acryloxysuccinimide.

12. (Currently Amended) The synthetic co-polymer according to claim ~~3~~2 that comprises N-isopropylacrylamide, acrylic acid and N-acryloxysuccinimide.

13. (Withdrawn) A bio-synthetic matrix comprising:

(a) the synthetic co-polymer according to claim 1;

(b) a bio-polymer; and

(c) an aqueous solvent,

wherein said synthetic co-polymer and said bio-polymer are cross-linked through said pendant cross-linkable moiety to form a hydrogel.

14. (Withdrawn) The bio-synthetic matrix according to claim 13, wherein the amount of synthetic co-polymer is between about 0.1 % and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.

15. (Withdrawn) The bio-synthetic matrix according to claim 13, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

16. (Withdrawn) The bio-synthetic matrix according to claim 13 further comprising one or more bioactive agent.

17. (Withdrawn) The bio-synthetic matrix according to claim 16, wherein said one or more bioactive agent is covalently bonded to said synthetic co-polymer through said pendant cross-linkable moiety.

18. (Withdrawn) The bio-synthetic matrix according to claim 16, wherein said bioactive agent comprises the pentapeptide having the sequence YIGSR (SEQ ID NO:1).

19. (Withdrawn) The bio-synthetic matrix according to claim 16, wherein said one or more bioactive agent is dispersed in said matrix.

20. (Withdrawn) The bio-synthetic matrix according to claim 13, further comprising a plurality of cells dispersed in said matrix.

21. (Withdrawn) A method for regenerating tissue in an animal comprising the step of implanting the bio-synthetic matrix according to claim 13 such that said bio-synthetic matrix acts as a scaffold for tissue regeneration in said animal.

22. (Withdrawn) A method for replacing damaged or removed tissue in an animal comprising the step of implanting the bio-synthetic matrix according to claim 13 in said animal.

23. (Withdrawn) The method according to claim 22, wherein said tissue is skin or part of an organ.

24. (Withdrawn) The method according to claim 22, wherein said tissue is a cornea or a part of a cornea.

25. (Withdrawn) A method for coating a surgical implant comprising the step of applying the bio-synthetic matrix according to claim 13 to a surface of said surgical implant.

26. (Withdrawn) A composition comprising:

(a) one or more bioactive agent;

(b) the synthetic co-polymer according to claim 1;

(c) a bio-polymer; and

(d) an aqueous solvent.

27. (Withdrawn) A composition comprising:

(a) a plurality of cells;

(b) the synthetic co-polymer according to claim 1;

(c) a bio-polymer; and

(d) an aqueous solvent.

28. (Withdrawn) The composition according to claim 27, wherein the amount of synthetic polymer is between about 0.1% and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.

29. (Withdrawn) The composition according to claim 27, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

30. (Withdrawn) The composition according to claim 27, wherein said synthetic co-polymer and said bio-polymer are cross-linked.

31. (Withdrawn) The composition according to claim 27, wherein said bioactive agent is covalently attached to said synthetic co-polymer through said pendant cross-linkable moiety.

32. (Withdrawn) The composition according to claim 27, which is formulated as an injectable solution, wherein said synthetic co-polymer and said bio-polymer are capable of cross-linking to form a hydrogel in vivo.

33. (Withdrawn) The composition according to claim 27, which is a pre-formed hydrogel.

34. (Withdrawn) An implant for use in tissue engineering comprising a pre-formed bio-synthetic matrix, said matrix comprising an aqueous solvent and a bio-polymer cross-linked with the synthetic co-polymer according to claim 1.

35. (Withdrawn) The implant according to claim 34, wherein said bio-polymer is selected from the group of. collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

36. (Withdrawn) The implant according to claim 34, wherein the amount of synthetic polymer is between about 0.1 % and 30% by weight, the amount of bio-polymer is between about 0.3% and 50% by weight and the amount of aqueous solvent is between about 20% and 99.6% by weight.

37. (Withdrawn) The implant according to claim 34, wherein said bio-synthetic matrix supports in-growth of nerves.

38. (Withdrawn) The implant according to claim 34, further comprising one or more bioactive agent.

39. (Withdrawn) The implant according to claim 38, wherein said bioactive agent is covalently attached to co-polymer through said pendant cross-linkable moiety.

40. (Withdrawn) The implant according to claim 34, further comprising a plurality of cells dispersed in said matrix.

41. (Withdrawn) The implant according to claim 40, wherein said cells are stem cells or precursor cells.

42. (Withdrawn) Use of the implant according claim 34 as an artificial cornea.

43. (Withdrawn) A process for preparing a synthetic co-polymer comprising:

(a) dispersing one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety in a solvent in the presence of an initiator;

(b) allowing said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl-carboxylic acid co-monomer to polymerise to form a synthetic co-polymer, and

(c) optionally purifying said synthetic co-polymer.

44. (Withdrawn) A process for preparing a bio-synthetic matrix comprising the steps of :

(a) preparing a synthetic co-polymer by the process according to claim 43;

(b) dispersing said synthetic co-polymer and a bio-polymer in an aqueous medium; and

(c) allowing said synthetic co-polymer and said bio-polymer to cross-link to provide said bio-synthetic matrix.

45. (Withdrawn) The process according to claim 43, wherein the N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and the hydrophilic co-monomer are the same.

46. (Withdrawn) The process according to claim 43, wherein the N-alkyl or N,N-dialkyl substituted acrylamide co-monomer and the hydrophilic co-monomer are different.

47. (Withdrawn) The process according to claim 44, further comprising mixing said synthetic co-polymer with one or more bioactive agent prior to step (b) and allowing said bioactive agent to cross-link to said synthetic co-polymer through said pendant cross-linkable moiety.

48. (Withdrawn) The process according to claim 44, further comprising mixing said synthetic co-polymer and said bio-polymer with a plurality of cells in step (b).

49. (Currently Amended) A synthetic co-polymer produced by ~~the process according to claim 43.~~

(a) dispersing one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl- carboxylic acid co-monomer derivatised to contain a pendant cross-linkable moiety in a solvent in the presence of an initiator;

(b) allowing said one or more N-alkyl or N,N-dialkyl substituted acrylamide co-monomer, one or more hydrophilic co-monomer and one or more acryl- or methacryl-carboxylic acid co-monomer to polymerise to form a synthetic co-polymer, and

(c) optionally purifying said synthetic co-polymer,

wherein said acrylamide co-monomer and said one or more hydrophilic co-monomer are different, and wherein said co-polymer is suitable for implantation in a patient.

50. (Withdrawn) A bio-synthetic matrix produced by the process according to claim 44.

51-110. (Cancelled)

111. (Currently Amended) The synthetic co-polymer according to claim ~~1~~ 2, wherein said alkyl or lower alkyl is cycloalkyl group having between three and six carbon atoms.

112. (Withdrawn) The composition according to claim 26, wherein the amount of synthetic polymer is between about 0.1% and about 30% by weight, the amount of bio-polymer is between about 0.3% and about 50% by weight and the amount of aqueous solvent is between about 20% and about 99.6% by weight.

113. (Withdrawn) The composition according to claim 26, wherein said bio-polymer is selected from the group of collagens, denatured collagens, recombinant collagens, gelatin, fibrin-fibrinogen, elastin, glycoprotein, alginate, chitosan, hyaluronic acid, chondroitin sulphate, glycosaminoglycan (proteoglycan), and derivatives thereof.

114. (Withdrawn) The composition according to claim 26, wherein said synthetic co-polymer and said bio-polymer are cross-linked.

115. (Withdrawn) The composition according to claim 26, wherein said bioactive agent is covalently attached to said synthetic co-polymer through said pendant cross-linkable moiety.

116. (Withdrawn) The composition according to claim 26, which is formulated as an injectable solution, wherein said synthetic co-polymer and said bio-polymer are capable of cross-linking to form a hydrogel in vivo.

117. (Withdrawn) The composition according to claim 26, which is a pre-formed hydrogel.

118. (New) The synthetic co-polymer of claim 1, which is suitable for corneal implantation in a patient.